Space Weather Forecast

Issued on Saturday, 27 July 2024 at 13:29 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: G1-G2/Minor to Moderate Storms expected into Days 3 and 4 (29-30 Jul) given potential CME (coronal mass ejection) arrivals. Isolated R1-R2 Minor to Moderate Radio Blackouts likely throughout.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate, with the largest Moderate flare observed peaking at 27/0237 UTC from the complex of spots in the southeast. A Moderate flare was also observed from the AR3762 region at 27/0546UTC, with both the previously mentioned areas contributing to a further Moderate flare at 27/1040UTC. There are ten sunspot regions on the solar disc, with AR3768 and AR3769 recently numbered. AR3762 in the southwest quadrant remains the largest and most complex region. A cluster of sunspot regions is also transiting across the southeast quadrant, which have been growing in complexity as they transit across the disc although most spots seems largely stable in recent hours. All other remaining regions appear small, simple and/or largely unchanged.

The large CME (coronal mass ejection) observed to the east early on the 27th has been assessed as far-sided. However subsequent features associated with the above mentioned Moderate flares indicates likely CME activity. Any CME associated with the first flare remains under investigation but a CME associated with the second flare has been assessed as likely Earth directed and we await modeling data.

Solar Wind / Geomagnetic Activity: Solar winds were initially elevated around 540km/s, steadily before declining to near 440 km/s. The Interplanetary magnetic field, Bt, was at weak to moderate levels. The north-south component, Bz, became weakly variable during the period. Geomagnetic activity was generally Quiet to Unsettled (Kp 2-3), with Active (Kp4) intervals observed 26/1200-1500 UTC and 27/0900-1200 UTC.

Energetic Particles / Solar Radiation: Solar radiation was at background levels.

Four-Day Space Weather Forecast Summary

Solar Activity: Activity is expected to be Low to Moderate with further M-class flares likely and slight chance of isolated X-class flares.

Solar Wind /Geomagnetic Activity: Confidence in a CME arriving early in the period is lowering, with the risk reducing as we move through the remainder of day 1 (27 Jul). A CME from the southern centre disk was observed in imagery late on the 26th. This feature analysed as Earth directed with an arrival into day 4 (30 Jul). Confidence in the timing of this feature is reduced however given further CME activity early on the 27th. A further CME was observed associated with a recent Moderate flare from AR3762, this is likely Earth directed and while we await modeling data initial assessment suggests an arrival sometime later on day 3 (29 Jul) with most likely some interaction with the previous CME. Overall, there is significant uncertainty in the

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forecast through this period with larger far-sided activity heavily contaminating imagery and reducing analysis confidence.

Current solar wind speeds are thought likely to gradually decline in the absence of CME influence over the next couple of days to remain at generally background to slightly elevated levels.

Geomagnetic activity is currently expected to be generally Quiet to Unsettled to start, with a slight chance of Active to G1/Minor storm intervals on day 1 if we see any CME influence. Into days 3 and 4 activity is expected to increase with G1-G2 Minor to Moderate storm intervals expected and a slight chance of G3-G4 Strong to Severe intervals given the potential for CME arrival as discussed above.

Energetic Particles / Solar Radiation: Solar radiation is most likely to remain at background levels. However, there is a slight chance of rising above the S1/Minor Radiation Storm threshold in response to any notable flares.

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Met Office Space Weather Forecast

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	10	80	80
Strong	G3	No	1	1	20	20
Severe	G4	No	1	1	5	5
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	60	60	60	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	10	10	15	15
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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